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ABSTRACT

Carnegie Mellon Online has been used to deliver several university courses to thousands of students at Carnegie Mellon University (Pittsburgh, Pennsylvania) over the last 2 years. This paper describes the experiences gained from redesigning an introductory art history course using Carnegie Mellon Online to deliver supplemental course content. The technology, course content and structure, assessment tools, and course management capabilities are discussed, as well as lessons learned from creating this course. Plans for the next version are also highlighted. (Author/AEF)

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Online Art History: Design, Development, and Review of an Interactive Course

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Abstract: Carnegie Mellon Online has been used to deliver several university courses to thousands of students at Carnegie Mellon University over the last two years. This paper describes the experiences gained from redesigning an introductory art history course using Carnegie Mellon Online to deliver supplemental course content. The technology, course content, and structure, assessment tools, and course management capabilities are discussed, as well as lessons learned from creating this course, and plans for the next version.

This paper describes the experiences gained from redesigning an introductory art history course using Carnegie Mellon Online to deliver supplemental course content. Carnegie Mellon Online is a database driven, web-based educational tool that has been used to deliver several university courses to thousands of students at Carnegie Mellon University. The technology, course content, and structure, assessment tools, and course management capabilities are discussed, as well as lessons learned from creating this course, and plans for the next version. Descriptions of Carnegie Mellon Online courses are available at http://online.web.cmu.edu/.

The Technology: Carnegie Mellon Online

Carnegie Mellon Online is a unique, database driven, educational tool taking advantage of the World Wide Web to provide student-centered instruction. The system generates customized content, such as assessments and feedback for each student and tracks the student through a course while maintaining course-specific rules and policies. Using this system, the instructor sets guidelines and prerequisites for student advancement through the course material, allowing the progress of each student to be individualized and paced for his or her learning style. It also provides students with more control over their learning experience by permitting them to access their class at any time they choose and as often as they choose, as best suits their needs.

Carnegie Mellon Online is not limited to a specific discipline or type of course. Courses in all university disciplines can make use of its unique, student-centered approach to education in a variety of ways. It can be used to offer completely online courses that never meet in a classroom, can act as an online management and learning tool to complement classroom-based courses, or it can act solely as an assessment tool.

One of Carnegie Mellon Online's strengths is it's ability to handle assessments. Like the rest of the system, assessments are data-driven; a standard set of code generates individualized assessment descriptions, generates the HTML forms, delivers the assessments, accepts the assessments, automatically grades certain types of assessments, and delivers feedback to the students.

Security is always a concern when delivering classes via the web. A student must use a password to access any course learning material, assessments, or feedback. Students use their university password to access Carnegie Mellon Online. This same password is used to access their email, grades, course registration

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sites, etc., which reduces the likelihood that students will share their passwords with other students to cheat on their course work.

The Course: Pre-Industrial Visual Cultures; to 1789

Pre-Industrial Visual Cultures; to 1789 (PVC) is the first course in a three-semester sequence of courses required of majors in the School of Art at Carnegie Mellon University. It is geographically and chronologically the most broad of the three courses, introducing students to the ideas and artifacts of world cultures from Paleolithic cave paintings to the French Revolution and including Africa, India, China, Japan and the Ancient Americas.

The structure of the course is twice-a-week lectures and once-a-week discussion sessions. Lectures focus on works of art in their cultural context. For example, a lecture on the art of India investigates how visual expressions reflect historical background, politics, geography, social structure, religious beliefs, and the role of the artist in India. One class per week focuses on synthesis topics, such as mythology, the role of the artist, and patronage, which explore thematic comparisons across cultures. In these sessions, students are assigned to work in small groups to brainstorm ideas, discuss issues and make summary presentations. For example, when we discussed archaeology as a topic, each student group developed a set of questions that an archaeologist would ask about an artifact and made conclusions about the artifact that they were given. The assignment for the topic required that students discuss what an archaeologist in the future would say about our culture from unearthing a shopping mall or a gallery showing their own artwork.

Since the Spring of 1995, Carnegie Mellon art historian Mary Schmidt has taught this course by projecting images and text in the classroom with a custom-designed, infinitely modifiable digital image database. She has also developed a text-based web syllabus with course overview, calendar, readings, links to relevant websites, and essay assignments.

PVC Online

In the Summer of 1997, Schmidt, Rehak, Blackmon, Bajzek, and a team of others collaborated to turn the classroom teaching tools and web syllabus into comprehensive web-based learning tools via Carnegie Mellon Online. The result was the delivery of a database driven, interactive website that contains all of the materials supplementary to the classroom experience – except for the required text book and visits to the museum. The site contains a course overview, calendar, images, timelines, maps, reading assignments, and links to other websites. It quizzes students on their reading assignment before each class period and accepts their weekly, electronically submitted essays. On a daily basis, it gives them their personal status in the course with regard to upcoming and/or overdue assignments and their cumulative grade. When students login, it opens to the current topic for the day.

The first iteration for Spring 1998 exceeded some aspects of our original concept and fell short on some others. The assessment component proved to be a powerful tool. Students developed the sound practice of keeping up with the readings, and they improved their test taking abilities over the semester. They were prepared for class! No weekly essays for this class of 55 students were lost. No *my-dog-ate-it* excuses. Admittedly there were computer glitches; many students required extra help to set up their web browsers to upload their written assignments.

We planned a searchable database of images but due to time constraints, settled for a sample of linear sequence images for each culture topic. Likewise, we planned a glossary but temporarily postponed its development. Both components are priorities for the second iteration for Spring 1999.

Structure of the Online Course

Content

The PVC Online interface structure gives students access to guideline information about the course and to their status with regard to grades and assignments as well as comprehensive materials for each day's topic.

Global Content

Instructor information lists when and where the course meets, and gives the instructor's phone number, email address and office location. A course description outlines course goals, policies, and procedures and instructs students how to navigate the site. A calendar and a topics list display the schedule for the semester in two different formats. A status chart gives students individualized reports of the entire semester's quizzes and assignments – what has been completed and when each was submitted, what's late, what's due next, and what the cumulative score to date is (Figure 1). Another page lets each student know what's next, what is overdue and what the deadline is for each overdue item.

Culture Content

For each culture topic there is a brief introduction to the topic, reading assignments, map, timeline, images, links to other websites, and a quiz. Students may also, at any time, access global information for the entire semester. For example, students may toggle between the global map and local map; likewise between the timeline for the semester and the culture timeline, and they may read semester guidelines for quizzes, reading assignments, and links to other relevant websites. Images are selected examples for which the instructor holds the copyright. As already discussed above, four randomly generated questions comprise the quiz to be completed before class begins.

Synthesis Content

For each synthesis session there are a brief introduction to the discussion topic for the day, a reading assignment, and a description of the written assignment to be electronically submitted the following week. At the end of the assignment description are instructions for submitting an assignment electronically.

Interface

Students navigate the PVC Online website through clickable buttons. The interface is designed with buttons across the top for administrative information and left/right navigation backwards and forwards through the semester's topics (Figure 2). When students log in to the course, the first page that is presented is for the cultural or synthesis topic that will be discussed at the next class meeting. In the left column are bi-colored buttons for course content materials. All of the information that students call up through navigation of the site appear in the central frame of the window. Only links to other websites call up new windows. Details follow.

Header Row.

Buttons in the upper left of the header include Course Description, Mary Schmidt (for who, what, when, and where information), Calendar and Topics List. In the upper right are Your Status, Do/Due Now, Today and Logout. The upper center frame indicates the current topic title with left and right arrows to move forward or backward through the topics for the semester.

Left Column.

There are two sets of bi-colored buttons, one each for culture and synthesis topics. Culture buttons include Home, Readings, URLs, Maps, Timelines and Quizzes. The light blue left side brings up semester-wide information; the dark blue right side, information specific to each day's topic.

Assessments

Because of Carnegie Mellon Online's assessment capabilities, we decided to encoura courage students to be prepared for class by requiring them to take a short quiz based on the text before attendi tending class. Like paper- based quizzes, the instructor had to decide what kind of quiz was appropriate for testing sting the students' comprehension; she chose to use a four question, multiple-choice quiz.

For paper-based quizzes, the instructor would simply write four questions per topic a pic and photocopy the quiz for each student.

However, since the Online technology can generate individualized, randomly generat erated quizzes for each student, the instructor divided each quiz into four topics and created three multiple-choice hoice questions for each topic. For each student, the system chose one question from each of the four topics, rando ndomly permuted the answers, and generated the HTML form for the quiz.

In addition to creating the quiz content, the instructor had to determine the policy fo y for the quizzes, such as: tart a quiz? turn

- when can a student start a quiz? when is the last time that a student can start it in?
- when is a quiz due? what is the penalty for turning it in late? iz or another
- can a student choose to retake a quiz? how many times? is it the same quiz o randomly generated quiz? what is the penalty? iz?
- can a student see any of the course's online learning material during a quiz?
- what feedback does the student get? icy decisions and

In order to show the flexibility of Carnegie Mellon Online, the instructor's policy d rationale are presented. week before the

A quiz is due thirty minutes before the class meeting and may be started up to a we e penalized 25%, class. This discourages students from finishing a quiz just as the class starts. Late quizzes are pe the class, which which is the equivalent of missing one question. A quiz may be taken up to two weeks after the prevents students from waiting until the end of the semester to do all the quizzes. uiz, which carries

Students who do poorly on a quiz can elect to take a second randomly generated quiz, a 25% penalty. Students are allowed to see all of the course's online material during a quiz. ions. The student

After submitting a quiz, a student is not shown the correct answers or even the questions from compiling is only told how many questions were answered correctly. This policy discourages students fro structor however printouts of questions and answers and sharing them with current or future students. The instru nts may discuss has access to the individual questions and the student's answers for each quiz. Students cise this option. individual quiz results privately with the instructor, but have not expressed much need to exercise ether on quizzes.

The instructor realizes that these policies do not prevent students from working together to take quizzes However, the security system discourages students from giving their password to one student to nts answers. We for the group, and the individualized quizzes make it harder for students to copy other students students to read, believe that these measures bring about the intended goal of these quizzes – to encourage stud dividually or in think, and talk about the material before coming to class, whether they take the quizzes indiv groups.

Policy for Written Assignments

Students are also required to submit one written assignment per week; this is done as as a file upload through the course's web interface. As with the quizzes, the instructor had to determine the poli policy for these written assessments. ts are penalized

Written assignments are due on a day when the class does not meet. Late assignments a e assignment is 25%. The assignment submission page is available from 30 minutes after the class in which the a

discussed until two weeks after the due date. This prevents students from submitting all assignments at the end of the semester. However at any point during the semester, the student may see the instructions for the assignment.

Papers may not be rewritten and resubmitted. The system only allows a student to submit a single paper. Students are allowed to see all of the course's online material while working on an assignment.

After a student submits an assignment, an acknowledgment is given that the paper has been accepted.

Students receive written feedback on their papers from the instructor. The instructor's interface is described below.

Management Tools

Through a separate administrative interface, the instructor has electronic access to statistical information about quizzes, to individual student's status reports, to grade summaries for the entire class, and to screens which allow changes and corrections to accommodate idiosyncrasies – student illness, adding and dropping the class, re-writing essays.

For the first time, the instructor is able to do something she has always wanted to do, but didn't have the time to do: compile a statistical analysis of students' answers to quiz questions. The quiz summary displays in graphic format how many students scored 4 out of 4, 3 out of 4 and so forth; and displays how many right and wrong answers there are for each question. It gives her the opportunity to assess the clarity and fairness of questions as well as students' understanding of the material.

Since Carnegie Mellon Online compiles and reports each student's cumulative numerical score and percentage, reporting mid-semester and final grades for 55 students is much less labor intensive than in the past.

The instructor can change an individual student's deadline for quizzes and assignments in case of illness, can change a quiz score after a well-argued rationale for a wrong answer, can change a grade for a re-written essay, and can add or delete students on the class roster.

Lessons Learned and Future Plans

Rethinking assessments.

Much of the time spent in moving the course to the Carnegie Mellon Online was spent in rethinking assessment tools. In previous years, the instructor would use less frequent tests based upon both the lectures and readings. With the new automated system, the instructor chose to use quizzes before class meetings to promote reading. But this brought a new problem. Test questions from lectures and readings which address issues of comparison across time and cultures are missing. The next iteration of the course will include monitored web-delivered mid-semester and final tests.

Student Reaction

Spring 1998 students are excited to be a part of this project. They showed we're-all-in-this- together enthusiasm, exhibiting patience when there are computer glitches, studying together, and discussing art history. Other faculty who teach the same students relate that students think it is great to have "all this stuff" available to them. Though these students have been thoroughly assessed through twice-a-week quizzes and weekly essays, there have been no complaints about the work load.

A Priori Content

In this first version of Carnegie Mellon Online, all content had to be entered before the beginning of the semester. This placed a large burden on the instructor to plan the course content, assessments, and policy well before the semester started. For this art history course, the course interface and policy were set about six

months before the semester; the majority of the content and assessment questions were in place about four weeks before the semester, with the remainder of the time spent refining the content and testing the system.

On the other hand, the benefit of this requirement is that the instructor is now free to spend more time with the students and planning individual lectures. Furthermore, this allows students to see the content for the entire semester at any time during the course. It also prevents students from having an inconsistent experience with the course – namely the threat of a student seeing material, and then having it be changed by the instructor without the student's knowledge, and the student not seeing the new material.

Though the benefit outweighs the burden, many instructors may not want to commit so much planning time before a class and may not have the time to prepare the entire content before the class starts. The next version of Carnegie Mellon Online will allow an instructor to add and update the course's content during the semester.

Future Plans.

The next version of this course will have several enhancements including a glossary, assign ments based upon the web materials, and web-delivered mid-term and final exams with new kinds of test items in addition to multiple choice questions, such as matching, short answer, and image identification items.

The most important addition will be an image database to replace the current linear sequence of sample images. Schmidt has over 2,000 digital images of artifacts relevant to this course. We will create an interface that will allow students to search the database based on several descriptors of the artifacts, including artist, location, period, style, theme, and type of image. The students will then have instant access to the found images. One of the exciting aspects of this database is that the term "image" is not limited to a single static image; instead, it includes any of the media that can be delivered over the web including movies, three-dimensional models, and virtual reality models.

Conclusion

For all of the participants in this project, the journey has been an intensive collaboration to integrate pedagogy and technology for the creation of a comprehensive and effective online teaching and learning tool. We are enthusiastic about the results and are planning improvements for the future.

Acknowledgments

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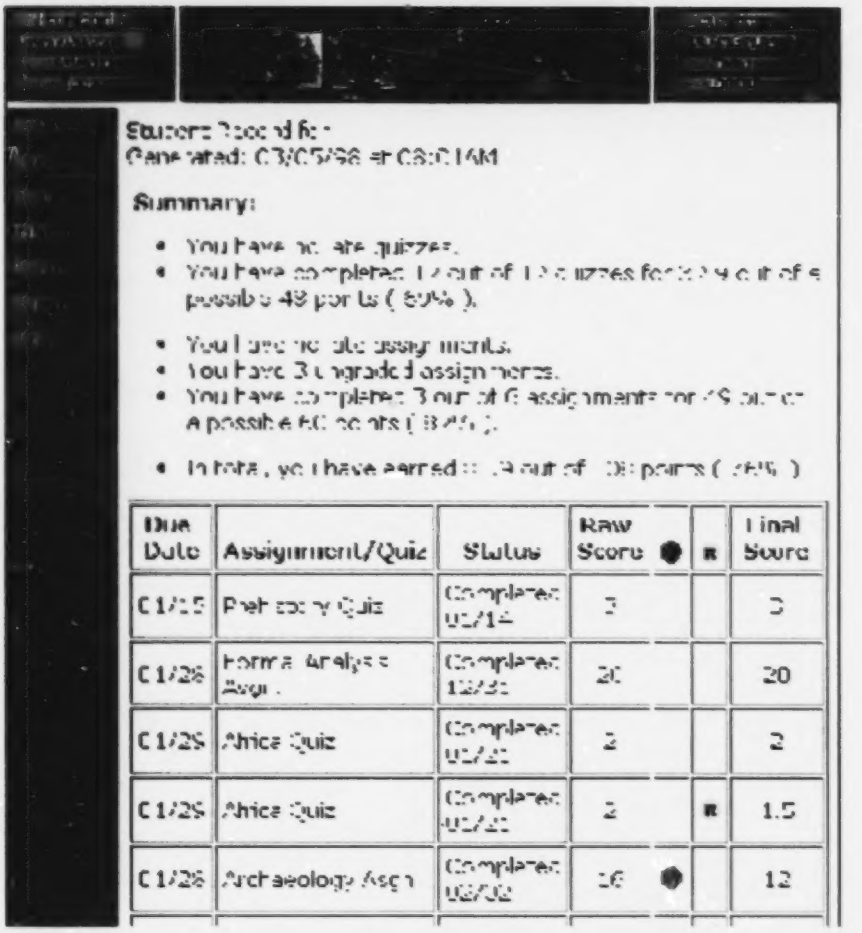

Student Record for:
Generated: 03/05/98 at 08:01AM

Summary:

- You have no late quizzes.
- You have completed 12 out of 13 quizzes for 234 out of 9 possible 48 points (80%).
- You have no late assignments.
- You have 3 ungraded assignments.
- You have completed 3 out of 6 assignments for 45 out of A possible 60 points (83%).
- In total, you have earned 279 out of 309 points (90%)

Due Date	Assignment/Quiz	Status	Raw Score		Final Score
01/15	Prehistory Quiz	Completed 02/14	3		3
01/26	Normal Analysis Assgn.	Completed 12/31	20		20
01/25	Ahica Quiz	Completed 02/21	2		2
01/25	Ahica Quiz	Completed 02/21	2	R	1.5
01/26	Archaeology Assgn	Completed 02/02	16		12

Figure 1: A Sample Status Page for a Student, Showing Aggregate Performance As Well As Individual Grades.

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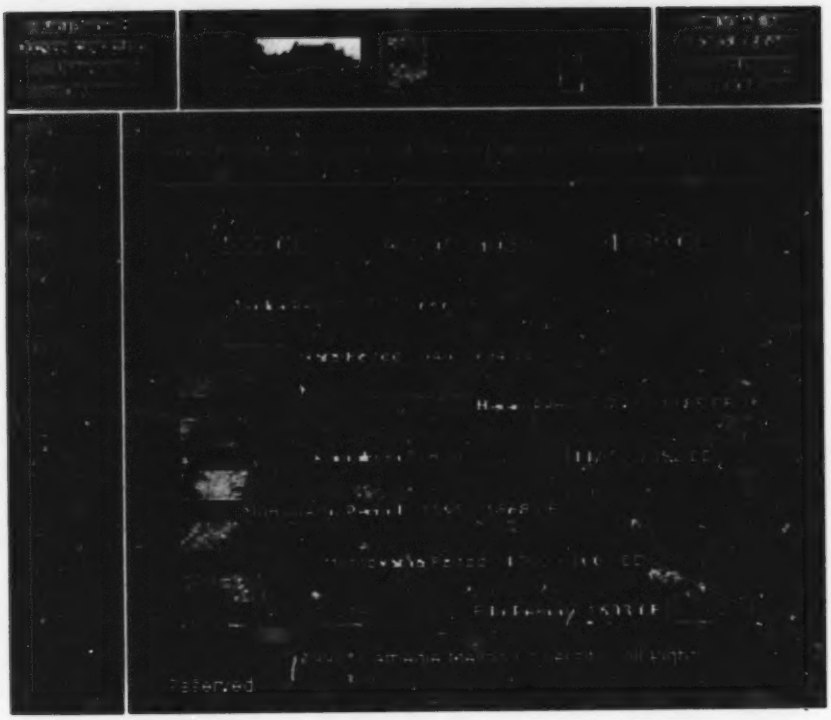

Figure 2: The Timeline for the Japanese Cultural Unit.

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